



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/451,108	11/30/1999	WANG RAE KIM	K-119	8600

7590 07/29/2003

Fleshner & Kim, LLP
14500 Avion Parkway
Suite 125
Chantilly, VA 20151

EXAMINER

KUMAR, PANKAJ

ART UNIT	PAPER NUMBER
----------	--------------

2631

DATE MAILED: 07/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/451,108

Applicant(s)

KIM, WANG RAE

Examiner

Pankaj Kumar

Art Unit

2631

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 7/2/2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9, 11-15, 17-20 and 22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15 and 19 is/are allowed.
- 6) ☒ Claim(s) 1-9, 11-14, 17, 18, 20 and 22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-9, 11-14, 20 have been considered but are moot in view of the new ground(s) of rejection.
2. Also, as per the examiner's amendment discussed on the telephone with the applicant, the examiner's amendment is being withdrawn since the application is no longer in condition for allowance based on the new grounds of rejection.

Claim Rejections - 35 USC § 112

3. Claims 17, 18 and 22 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
4. Claim 17 recites the limitation "claim 16" in line 1. There is insufficient antecedent basis for this limitation in the claim since claim 16 is cancelled. It should recite claim 15.
5. Claim 18 recites the limitation "claim 16" in line 1. There is insufficient antecedent basis for this limitation in the claim since claim 16 is cancelled. It should recite claim 15.
6. Claim 22 recites the limitation "claim 21" in line 1. There is insufficient antecedent basis for this limitation in the claim since claim 21 is cancelled. It should recite claim 13.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2631

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-9, 11-14, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Santos et al. 5119399.

9. As per claim 1, Santos teaches a vector modulator, comprising: a first amplitude invariant (inherent for a good phase shifter to be amplitude invariant) phase shifter to shift a phase of an input signal (Santos fig. 1: the input of element 15 is a local oscillating signal which has a phase which element 15 shifts to 0 degrees and 90 degrees); a coupler to separate an output of the first amplitude invariant phase shifter into first and second channel signals (Santos fig. 1: 15 separates into I and Q components. What Santos does not show is that the coupler is a separate component from the first amplitude invariant phase shifter. It would have been obvious to one skilled in the art at the time of the invention to modify Santos to divide element 15 of into the two components since it has been held that rearranging parts of an invention requires routine skill in the art. Also, lacking any criticality, to shift location of prior art parts does not make the claimed invention patentable over that prior art (In re Japikse, 86 USPQ 70). Also, lacking any criticality, to make prior art parts separable does not make the claimed invention patentable over that prior art (Nerwin v. Erlichman, 168 USPQ 177).); a second amplitude invariant phase shifter (Santos fig. 1: 17) to shift a phase (inherent for a phase shifter to do so) of the first channel signal; a third amplitude invariant phase shifter (Santos fig. 1: 21) to shift a phase of the second channel signal; and a combiner (Santos fig. 1: 25) that receives and combines signals from the second and third invariant phase shifters (Santos fig. 1: 25 receives signals from 17 and 21 via 19 and 23) and provides an output, wherein the first, second and third amplitude invariant phase shifters

Art Unit: 2631

respectively shift within first, second and third prescribed shifting ranges (Santos fig. 1: 15 shifts between 0 and 90, 17 shifts to adjustable phase ϕ_1 – col. 4 lines 43-44, 21 shifts to adjustable phase ϕ_2 col. 4 lines 49-52, last full paragraph col. 4).

10. As per claim 2, Santos teaches the vector modulator of claim 1, wherein the coupler is quadrature hybrid (Santos fig. 1: 15 outputs inphase and quadrature and its input is a hybrid of the two) coupler selected from one of a branch line (Santos fig. 1: output of 15 divides into two branches), a Lange coupler, and a Wilkinson divider.

11. As per claim 3, Santos teaches the vector modulator of claim 1, wherein the first amplitude invariant phase shifter delays the input signal by fixed intervals (Santos fig. 1: inherent for 15 to cause a fixed delay) within a first prescribed shifting range of approximately 0° -- 360° (not in Santos. Instead Santos teaches shifting range of 0 to 90 degrees. It would have been obvious to one skilled in the art at the time of the invention to modify Santos since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.).

12. As per claim 4, Santos teaches the vector modulator of claim 1, wherein the second amplitude invariant phase shifter delays the first channel signal by a prescribed phase within a variable phase range of approximately 0° -- 90° (not in Santos. Instead Santos teaches in col. 4 last full paragraph teaches that ϕ_1 is arbitrarily adjustable. It would have been obvious to one skilled in the art at the time of the invention to modify Santos with a range for ϕ_1 to be from 0 to 90 degrees since it has been held that where the general conditions of a claim are disclosed in

Art Unit: 2631

the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.).

13. As per claim 5, Santos teaches the vector modulator of claim 1, wherein the third amplitude invariant phase shifter delays the second channel signal by a prescribed phase within a variable phase range of approximately 0° --- 90° (not in Santos. Instead Santos teaches in col. 4 last full paragraph teaches that ϕ_2 is arbitrarily adjustable. It would have been obvious to one skilled in the art at the time of the invention to modify Santos with a range for ϕ_2 to be from 0 to 90 degrees since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.).

14. As per claim 6, Santos teaches the vector modulator of claim 1, wherein each of the first, second and third amplitude invariant phase shifters is a reflection type amplitude invariant phase shifter (Santos fig. 1: the outputs of the components are a reflection of their inputs).

15. As per claim 7, Santos teaches the vector modulator of claim 6, wherein each of the first, second and third amplitude invariant phase shifters includes at least one PIN diode (not in Santos. It would have been obvious to one skilled in the art at the time of the invention to modify Santos to teach these elements since it has been held that the selection of known material based on its suitability for the intended use for prior art parts does not make the claimed invention patentable over that prior art (In re Leshin, 125 USPQ 416).) and a hybrid coupler (Santos fig. 1: 15, 17, 21 couple to the hybrid signal output of 13 via other components).

16. As per claim 8, Santos teaches the vector modulator of claim 6, wherein each of the first, second and third amplitude invariant phase shifters includes at least one varactor diode (not in

Art Unit: 2631

Santos. It would have been obvious to one skilled in the art at the time of the invention to modify Santos to teach these elements since it has been held that the selection of known material based on its suitability for the intended use for prior art parts does not make the claimed invention patentable over that prior art (In re Leshin, 125 USPQ 416).) and a hybrid coupler (Santos fig. 1: 15, 17, 21 couple to the hybrid signal output of 13 via other components).

17. As per claim 9, Santos teaches the vector modulator of claim 6, wherein each of the first, second and third amplitude invariant phase shifters includes at least one PIN diode and a circulator (not in Santos. It would have been obvious to one skilled in the art at the time of the invention to modify Santos to teach these elements since it has been held that the selection of known material based on its suitability for the intended use for prior art parts does not make the claimed invention patentable over that prior art (In re Leshin, 125 USPQ 416).).

18. As per claim 12, Santos teaches the vector modulator of claim 1, wherein the first channel signal is an I channel signal and the second channel signal is a Q channel signal that is phase shifted approximately 90° from the I channel signal (Santos fig. 1: 15, 17, ϕ_1 , 21, ϕ_2).

19. Claims 13, 14 are discussed in claims 1-9 and 12 above.

20. As per claim 20, Santos teaches the vector modulator of claim 1, wherein the first amplitude invariant phase shifter adjusts a distribution of signals outputted from a combiner in a polar coordinate system (Santos fig. 1: 0 and 90 degrees are in a polar coordinate system) by adjusting phases of incoming signals (Santos fig. 1: 15 is adjusting the phase to 0 and 90 degrees).

21. As per claim 22, Santos teaches the vector modulator of claim 21, wherein the combiner calculates a vector sum (Santos fig. 1: 25) wherein the first amplitude invariant phase shifter

Art Unit: 2631

delays the input signal by fixed intervals (Santos fig. 1: inherent for 15 to cause a fixed delay) within the first prescribed shifting range (Santos teaches shifting range of 0 to 90 degrees.) wherein the second and third amplitude invariant phase shifter (Santos fig. 1: 17, 21) delay the first and second channel signals (Santos: inherent for components 17 and 21 to cause a delay in I and Q channels) by first and second phases (Santos col. 4 last full paragraph: ϕ_1 , ϕ_2) within the second and third prescribed shifting ranges (Santos teaches in col. 4 last full paragraph teaches that ϕ_1 and ϕ_2 are arbitrarily adjustable.)

Allowable Subject Matter

22. Claims 17 and 18 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

23. Claims 15, 19 are allowed.

24. The following is a statement of reasons for the indication of allowable subject matter:

25. As per claim 15, Belcher teaches a circuit for a high power amplifier (Belcher Field of Invention: "... adaptive RF power amplifier ..."), comprising: a divider (Belcher fig. 2: 101) to divide an input signal into a first signal (Belcher fig. 2: 105) and a second signal (Belcher fig. 2: 107); a vector modulator (Belcher fig. 2: 110) to receive the first signal (Belcher fig. 2: 111 is a modified version of 105) and a control signal (Belcher fig. 2: 113 is a modified version of 107) and output a vector modulated signal (Belcher fig. 2: output of 110); an amplifier to amplify the vector modulated signal (Belcher fig. 2: 116); a directional coupler (Belcher fig. 2: 123) to receive a signal from the amplifier and generate a reference signal; and a fast phase-amplitude

Art Unit: 2631

controller (Belcher fig. 2: 180) to compare amplitudes and phases of the reference signal (Belcher fig. 2: input 181) and the second signal (Belcher fig. 2: 107) delayed for a prescribed time period (inherent for various components to cause delay), to provide the control signal, wherein the vector modulator comprises: a first amplitude invariant phase shifter to shift a phase of the first signal within a first prescribed shifting range; a coupler to separate an output of the first amplitude invariant phase shifter into I and Q channel signals having approximately a 90° phase difference relative to each other; a second amplitude invariant phase shifter to shift a phase of the first channel signal by a first fixed amplitude within a second prescribed shifting range; a third amplitude invariant phase shifter to shift a phase of the second channel signal by a second fixed amplitude within a third (not in Kumar or Belcher) prescribed shifting range; and a combiner to receive signals from the second and third invariant phase shifters and calculate a vector sum thereof and generate the vector modulated signal.

26. Claims 17, 18 and 19 depend on claim 15.

Conclusion

27. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period

Art Unit: 2631

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pankaj Kumar whose telephone number is (703) 305-0194. The examiner can normally be reached on Mon, Tues, Thurs and Fri after 8AM to after 6:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chi H. Pham can be reached on (703) 305-4378. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9314 for regular communications and (703) 872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4700.

PK
July 24, 2003

TEMESCHEN GHEBRETISSAE
PRIMARY EXAMINER